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Solar Based Hydroponics Cultivation

D.Sarathkumar
Assistant Professor
Department of Electrical and Electronics Engineering
Kongu Engineering College, Perundurai, Tamilnadu, India
***Email**: sarath.eee@kongu.ac.in*
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Abstract

The main aim of the project is to grow a plant without a soil by using solar supply. It uses the 90% of water efficiently. As compared to soil cultivation, the production increases by 3 to 10 times. Hydroponics is the method of growing plants without soil by using mineral nutrients solution in water solvents usually an inorganic substrate with rock wool to be the most common worldwide. Agriculture in the growing countries faces some serious challenges in the coming decades that include: competition for water, energy resources, rising costs, increased world population, competition for international markets, changes in climate, environmental impact and uncertainties in the effectiveness of the current European policies as regards adaptation strategies. Controlled environments become an important tool in agriculture production and study chains. Hydroponics is a promising technology and becomes very popular in the area of agriculture, specifically in urban farming. Hydroponic systems have found a rapid development and widespread use in recent years. In hydroponics cultivation, the recording of several parameters helps cultivators to develop optimal conditions for the growth of plants. In this paper, we present a low-cost, high-reliability prototype for real-time measurements in hydroponics cultivation.

Keywords: *Hydroponics Tray, Humidity Sensor, Buzzer, Arduino Uno, Solar Panel Array.*

INTRODUCTION

The balcony agriculture and family farming have more requirements for such a technique, which can not only increase the ornamental value, but also achieve an eco-friendly system. It is an inexpensive symbiotic cycle of plant. So, the system can save water more efficiently. The whole process is so complex and time-consuming. Based on the above shortcomings, the automatic control system is proposed. Consequently, it is very necessary to design a smart monitor and control system, especially for people who travel frequently and there is no need of frequent monitoring of water.

EXISTING METHOD

- Monitoring of hydroponics plant is by human.
- Frequent supply of water is required so time taken will be high.
- It is not eco friendly because supply to the motor is from main.
- Nutrient supply to the plant and draining of excess water is also by human.

DRAWBACKS OF EXISTING METHOD

- Continuous monitoring is required.
- Need of manual work is more.
- Cost is high.
- Crops requiring frequent watering needs more human effort to maintain water flow.

LITERATURE SURVEY

Mendez G.R., Mukho padhyay S.C [2016], "A Wi-Fi Based Smart Wireless Sensor Network for an Agricultural Environment". This existing method is

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used only for monitoring purpose, Signal problem.

Ferrndez-Pastor FJ, Garca-Chamizo JM, Nieto-Hidalgo M, Mora-Pascual J, Mora-Martnez J [2017]. "Developing Ubiquitous Sensor Network Platform Using Internet of Things: Application in Precision Agriculture". This existing method is Used only for security purpose. It is expensive.

PROPOSED SYSTEM

In our system we are going to implement solar based supply and automatic control of water flow. So, the cultivation of the plant can be increased faster than soil-based cultivation. By using solar we can reduce the cost of electricity and the space for the cultivation.

BLOCK DIAGRAM

The proposed system consists of four units:
Solar Panel, Relay, Arduino Uno, Pump. The entire process is controlled by means of arduino programming.

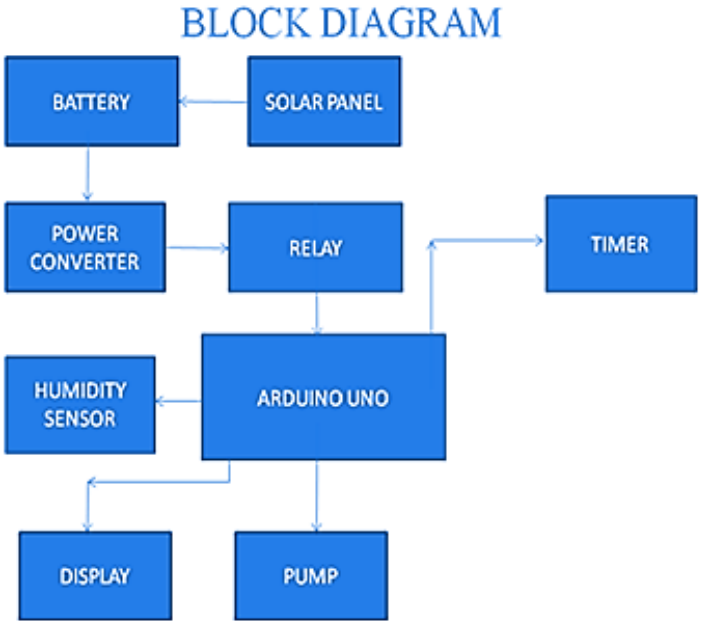

Figure 1: Proposed Block Diagram

The block diagram shows the working of the project. The supply to the system is through solar and normal main supply. Then the solar energy is taken in the battery and it is converted into power. The motor gets on or off through the relay. The electric circuit may be automatic and manual mode. The humidity sensor and timer are connected to the arduino UNO. Then upto the signal level the pump gets on or off.

HARDWARE IMPLEMENTATION

Working: The main aim of the project is to grow a plant without a soil by using solar supply. It uses the 90% of water efficiently. As compared to soil cultivation, the production increases by 3 to 10 times. The method of growing plants without soil by using mineral nutrients solution in water solvents.

EXPERIMENTAL SETUP

The main aim of the project is to grow a plant without a soil by using solar supply. It uses the 90% of water efficiently. As compared to soil cultivation, the production increases by 3 to 10 times. Hydroponics method of growing plants without soil by using mineral nutrients solution in water solvents.

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Figure 2: *Experimental setup*

HUMIDITY SENSOR

A humidity sensor (or hygrometer) senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature.

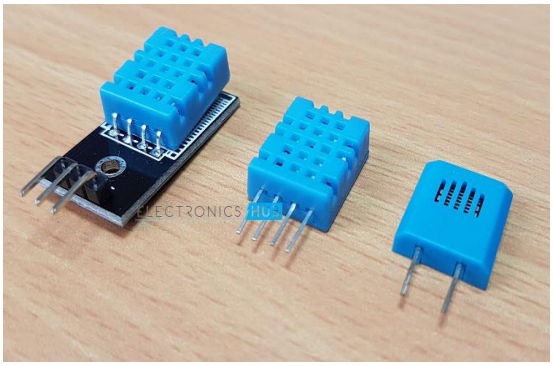

Figure 3: *Humidity Sensor*

In agriculture**,** Irrigation techniques like drip irrigation need accurate moisture content for plants. Also, the moisture in the soil plays an important role in the proper growth of the plant. Other areas where humidity control is required is indoor vegetation.

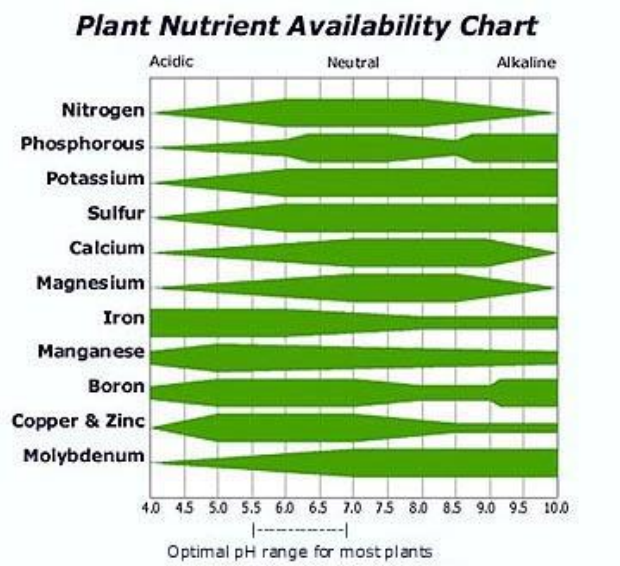

Figure 4: *Nutrients Chart*

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BUZZER FEATURES AND SPECIFICATIONS

- rated voltage: 6v DC
- operating voltage: 4-8V DC
- rated current: <30MA
- sound type: continuous beep
- resonant frequency: ~2300 Hz
- small and neat sealed packag

Figure 5: *Buzzer*

SOLAR PANEL ARRAY

Depending on construction, photovoltaic modules can produce electricity from a range of frequencies of light, but usually cannot cover the entire solar range (specifically, ultraviolet, infrared and low or diffused light). Hence, much of the incident sunlight energy is wasted by solar modules, and they can give far higher efficiencies if illuminated with monochromatic light. We have used a Power House 50W 12V Polycrystalline Solar Panel PWHP50 is a compact solar panel with easy installation setup. Perfect choice for On-Grid and Off-Grid systems. It can be used in several applications including marine, dry camp, and other off-grid applications. It has the capability of withstanding heavy snow and strong wind loads. Very reliable product and sure to provide long service life because of its multi layered sheet laminations which also enhances the cell performance. Excellent performance in even low-light environments. Corrosion-resistant aluminium frame for extended outdoor use, allowing the panels to last for decades. The panel is anti-reflective, high transparency, low iron-tempered glass with enhanced stiffness and impact resistance.

Figure 6: *Solar Panel*

CONCLUSION & FUTURE SCOPE

CONCLUSION

From this project we conclude implementation of hydroponic system using control circuit. It describes automation in various processes such as to check moisture automatically and accordingly supply water for particular time interval. This System uses less water and fertilizers as compared to soil system.

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FUTURE SCOPE

In Future consequently, it is very necessary to design a smart monitor and control system, especially for people who travel frequently and there is no need of frequent monitoring of water. In the Proposed system implemented by using ArduinoUNO controller. To improve the performance of system, possible to implement the advanced controllers.

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